SJIF Impact Factor: 5.464

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 6.
Issue: 4.
Page N. 01-12
Year: 2022

Original Article www.wjahr.com

CONSUMPTION SURVEY AND EVALUATION OF THE NUTRITIONAL QUALITY OF SIX MENUS OFFERED IN TWO FAST-FOOD RESTAURANTS IN ABIDJAN (CÔTE D'IVOIRE)

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Received date: 26 January 2022 **Revised date: 15** February 2022 **Accepted date: 07** March 2022

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ABSTRACT

The fast-food sector is booming in Côte d'Ivoire, precisely in Abidjan. This study aimed to determine the socio-demographic profile of the customers of two fast-food restaurants (FFR1 and FFR2) and the nutritional quality of their main menus. A food consumption survey was conducted among 150 consumers from FFR1 and FFR2 located, respectively, in the communes of Cocody and Adjamé. Six dishes proposed by these fast-food restaurants were, then, selected and analyzed. The calculation of energy shares in nutrients of these dishes was also released. The results have shown that menus from both restaurants were equally well consumed by women (55% at FFR1 and 36% at FFR2) and men (45% at FFR1 and 64% at FFR2). The majority of consumers were teenagers (53.33% at FFR1 and 65.33% at FFR2). Most of whom were students (38.67% at FFR1 and 37.33% at FFR2) and consuming these foods, on average, once a week (40% at FFR1 and 56% at FFR2). These meals were very energetic (626.59 to 672.54 Kcal/100g), high in carbohydrates (36.03-41.85%), fat (27.53-36.21%), protein (15.33-24.00%) and sodium (207.60 to 296 mg/100g of food). However, they were poor in fiber (0.26 to 5.17%). Their energy shares in lipids (39.32 to 48.57%) were not in line with the recommended energy shares for a ration. FFR1 and FFR2 menus didn't present a good nutritional quality and were not balanced. Their regular consumption should be avoided, because they could promote the development of nutritional diseases, such as obesity, cardiovascular diseases, metabolic disorders and type 2 diabetes.

KEYWORDS: FFR1 menus, FFR2 menus, nutritional quality, energy shares, Cocody, Adjamé.

INTRODUCTION

Food plays an important role in the daily life of the man. It is at the heart of all the world civilizations, where it plays a social, cultural and vital role (Claquin et al., 2017). In addition to covering physiological needs, food is an essential element of the diversity of cultures. It reflects the evolution of societies, their lifestyles and their relationship with the environment (Bthissam, 2015). Over the past 50 years, the eating habits of previous centuries have changed significantly. New foods have been introduced, and others have virtually disappeared from the composition of meals. These profound changes have positive aspects as well as negative aspects in terms of nutrition and health. Today, the many upheavals resulting from the rapid transformation of society are increasingly leading to the globalization of food patterns. They favor the taking of meals outside the home (Claquin et al., 2017). Faced with these changes, commercial catering has adapted, in particular with the development of a catering offer so-called "fast" or "fast-food", offering simple, fast, convenient and inexpensive cuisine (Dubinsky-Titz, 2000). Responding to the needs of a large part of the population, fast-food has known a huge success in a few decades. Today, this type of catering includes many outlets forming veritable international chains (Carbonel, 2007).

While this phenomenon has been in place for generations in industrialized countries, it is recent in developing countries. In spite of this, there is a development extremely fast, even though these countries are still affected by problems of malnutrition due to general or specific nutrient excess or deficiencies (Bthissam, 2015). The visible emergence of a middle class, the arrival of multinationals, regional institutions and their cohorts of expatriates, means that Côte d'Ivoire represents a potential consumer market, which interests several global players in the fast-food industry. They are flocking to the

country in large numbers and prefer to set up shop in the city of Abidjan, its economic capital (Haby, 2017). These global fast-food giants represent a hope in terms of economic dynamism for this country (Haby, 2017). However, the quality of the meals offered by these restaurants is not always acceptable in terms of nutrition and health (Bahodaran et al., 2013).

Indeed, according to Pinto et al. (2021), the analysis of the food portion perspective of kids' meals from three common well-known restaurant chains in Portugal exceeds the requirements for the meat, fish, and eggs groups, as well as for fats and oils. For them, despite the balance associated with the macronutrients, the salt content exceeds the recommendations for most of the meals.

Thus, in order to provide additional information on the subject and to be in line with the nutritional policy of the Ivorian state to ensure the food security of its populations, it seemed appropriate to take an interest in this sector of the restauration which is in full rise in Côte d'Ivoire, more precisely in Abidjan.

The objective of this study was to contribute to the nutritional security of the population of Abidjan through the determination of socio-demographic profile of the customers of two fast-food restaurants in the communes of Cocody and Adjamé and the nutritional quality of the main menus consumed in these restaurants.

MATERIAL AND METHODS

Description of the study area

A food consumption survey as well as menu sampling were conducted in the fast-food restaurants FFR1 and FFR2, located respectively in the communes of Cocody and Adjamé (Abidjan, Republic of Côte d'Ivoire). Located to the east of Abidjan and occupying 20.8 % of the total area of the thirteen (13) communes of the District of Abidjan, Cocody covers an area of 132 km². It is bordered to the north by the municipality of Abobo, to the south by the Ebrié lagoon, to the east by the municipality of Bingerville and to the west by the municipalities of Adjamé and Plateau (Figure 1). This commune has the reputation of being a residential area, mostly inhabited by people of a high social level. The commune of Adjamé is located in the center of the district of Abidjan. It is bordered by the communes of Plateau, Attécoube, Cocody and Abobo (Figure 2).

Data collection of consumption survey

The consumption survey was conducted during ten (10) day from September 29th to October 8th, 2019. It took place in the premises of restaurants FFR1 and FFR2, located respectively in the communes of Cocody and Adjamé. These two communes were chosen in order to reach consumers from different social strata. Thus, Adjamé was chosen for a better representation of consumers from working-class neighborhoods, but also to have access to the most heterogeneous population, due to its position in the city and the fact that it is the most visited commune in Abidjan every day. As for the Cocody commune, it was chosen to reach both middle and upper social classes. The study was a cross-sectional study that involved women and men present in the fast-food restaurants visited. The latter were randomly selected. The interview was done individually, in French, with the volunteers, aged over 12 years. In all, 150 people were interviewed: 75 people at restaurant FFR1 and 75 people at restaurant FFR2. A simple and open questionnaire was submitted to them, covering their social profile (age, sex, profession and marital status), their preferences and habits, the frequency of consumption of fast-food meals, and their opinion about the probable impact of this type of food on health.

Data collection of biochemical composition

Sampling

The choice of menus to be analyzed by fast-food restaurant is based on the level of their consumption data collected from the consumers survey both on preferences and consumption habits of customers from FFR1 and FFR2.

At FFR1, there are the DC menu which is made with cheese, Patty's burger, chili cheese sauce, hamburger bun and jalapenos; the DW menu is made with hamburger bun, mayonnaise sauce, ketchup, lettuce, onions, tomatoes, pickle, cheese and beef and the BK menu which is made with sesame seed bun, Whopper patty, BK sauce, melted cheese, pickle, lettuce and onions.

At FFR2, there are the SLB menu composed by two wings and three strips of chicken, the WLB menu which is made of five chicken wings and the CLB menu composed of three large pieces of chicken.

All of these meals are accompanied by a portion of French fries and 30 cl of soft drink as desired. Thus, a sample was taken at random on the production line of each restaurant, at two different times of the day, for each selected menu. The first samples were taken in the morning at the opening of the fast-food restaurants and the second in the afternoon during the busy hours of the day.

In order to preserve the quality of the products, each of the sampled menus was transported in an insulated cooler. The duration of the transport of the samples, from their production to the laboratory was on average forty minutes.

Sample preparation

Each dish was first ground then oven dried at 50 °C for 48 h. After drying, the samples were ground to a fine powder with a blender (Moulinex, France). The resulting powders were stored in dry plastic boxes and stored in a laboratory refrigerator for analysis.

Biochemical analysis and energy values

Moisture, dry matter, ash, and proteins were determined by AOAC method (AOAC, 1990). Lipids were determined by Soxhlet method (AOAC, 1995). Total fiber content was determined using Weende method (Wolf, 1968). The amount of total carbohydrates was determined by difference as follow:

% Total Carbohydrates = 100 – (% moisture + % proteins + % lipids + % ash).

The energy value (E) of each menu was determined according to the calculation method of Atwater and Rosa (1899), supplemented by the energy value of the drink (EV_d).

E (Kcal/100 g) = [(% Lipids × 9) + (% Proteins × 4) + (% Carbohydrate × 4)] + EV_d

Mineral content was determined by atomic absorption spectrophotometry according to AOAC method (AOAC, 2005). Ash (0.1 g) was weighed in platinum crucibles to which was added 1 ml of distilled water. In each crucible, 5 ml of hydrofluoric acid 50 % and 2 drops of sulfuric acid (v / v) were added. The whole, well homogenized and heated at 100 °C until fully evaporated. The residue obtained was dissolved in 10 ml of 50 % hydrochloric acid. Solution was left to stand for 10 minutes on the bench and the final volume was brought to 100 ml. The analyzed minerals were calcium (422.7 nm), magnesium (285.2 nm), phosphorus (710 nm), potassium (766.5 nm), sodium (589 nm), iron (248.3 nm), and zinc (213.9 nm).

Energy share in nutrients

The energy share of the different nutrients (ESN) is calculated according to the following formula:

ESN = [(Energy amount of nutrient) / (Energy of proteins +Energy of carbohydrate + Energy of lipids)] × 100

With:

Energy of carbohydrate (Kcal/100 g) = (% carbohydrate × 4 Kcal) + EV_d

Energy of lipids (Kcal/100 g) = % lipids × 9 Kcal

Energy of proteins (Kcal/100 g) = % proteins × 4 Kcal

Statistical Analysis

The data collected during the consumption survey and those obtained after the biochemical analysis of the different menus, were processed using IBM SPSS Statistics 22.0 and EXCEL version 2016. The results were presented as mean ± standard deviation. Means with a significant difference were compared with each other Duncan's test at the 5 % significance level.

RESULTS

Characteristics of the respondents

Surveyed persons (150) were divided as follow: 55 % of women and 45 % of men in restaurant FFR1 then 36 % of women and 64 % of men in restaurant FFR2 (Figure 3).

Figure 4 shows that at both FFR1 and FFR2 restaurants, teenagers (15 to 24 years old) are the most numerous. At FFR1, they represent 53.33 % and at FFR2, 65.33 % of consumers. The second most represented category is adults (25 to 64 years old), who represent 45.34 % of consumers at FFR1 and 30.67 % at FFR2. Children aged 12 to 14 years are less represented with 1.33 % at FFR1 and 4 % at FFR2.

At FFR1, the respondents were mostly students (38.67 %) and employees (25.33 %). The liberal profession (16 %), pupils (8 %) and unemployed persons (2.67 %) were the least numerous (Figure 5). At FFR2, students were also the most numerous (37.33 %), followed by the liberal profession (22.68 %), pupils (20 %), employees (9.33 %), managers (5.33 %), and finally unemployed persons with 5.33 % (Figure 5).

At both FFR1 and FFR2, single people were the most numerous (Figure 6). They represented 85.33 % and 89.33 % of respondents at FFR1 and FFR2, respectively. Married people represented only 14.67 % at FFR1 and 10.67 % at FFR2.

The frequency of consumption of fast-food meals by the respondents is shown in Figure 7. Those who rarely had consumed these meals represented 26.67 % at FFR1 and 10.66 % at FFR2. Those who had eaten them, once a week, represented 40 % at FFR1 and 56 % at FFR2. Those who has consumed them, 2-4 times, represented 25.33 % at FFR1 and 56 % at FFR2 respectively (Figure 7). Respectively 8 % and 6.67 % of respondents had consumed these dishes more per week at FFR1 and FFR2.

Figure 8 shows the level of knowledge of the effects of fast-food consumption on health of consumers. Most consumers of FFR1 (40 %) and FFR2 (32 %) were unaware of the health effects of fast-food meals. In contrast, 33.33 % of FFR1 consumers and 24 % of FFR2 consumers thought that fast-food is bad for them. 6.67 % of FFR1 and 17.33 % of FFR2 consumers thought that fast-food is good for health. For 20 % of the consumers at FFR1 and 26.67 % at FFR2, the consumption of fast of fast-food meals has no effect on health.

The results of customers' menu choices at FFR1 and FFR2 are shown in Figure 9. At FFR1 in order of preference, consumers from FFR1 had opted for DW at 36 %, DC at 26.67 %, XL at 25.33 % and other menus at 12 %. At FFR2, the CLB was the most popular at 73.33 %. Thirteen-point three percent (13.33 %) had chosen the WLB, 8 % the SLB and 5.34 % had consumed other menus (Figure 9).

Biochemical compositions

Major constituent content and energy value of menus

Table 1 shows the major constituent content and energy of selected menus at FFR1 and FFR2. The water content of these meals was ranged from 7.78 % to 8.84 %. The

carbohydrate (36.03-41.85 %) and fat (27.53-36.21 %) contents were higher than the protein (15.33-24.75%), fiber (0.26-5.17 %) and ash (3.09-4.35 %) contents. FFR1 energy values (642.82 to 672.54 Kcal) were higher than those of FFR2 (626.59 to 637.25 Kcal). DW from FFR1 had the most calories.

Mineral content

Table 2 shows the mineral content of the FFR1 and FFR2 menus. FFR1 meals contained more minerals than FFR2 meals, the DW being the richest. In FFR1's menus, the levels of phosphorus (2083.5 to 2571.06 mg for full menus), magnesium (534.87 to 673.71 mg for full menu), iron (31.33 to 46.19 mg for full menu), and zinc (21.42 to 26.76 mg for full menus) were higher than the Recommended Nutrient Intake values. However, the levels of calcium (311.53 to 424.75 mg for full menus), potassium (702.74 to 1014.76 mg for full menu) and sodium (1332 to 1740.29 mg for full menus) were below these recommendations.

At FFR2, the contents of phosphorus (898.45 to 1267.36 mg for the complete menu) and iron (19.03 to 35.09 mg for the complete menu) contents were higher than the Recommended Dietary Allowances. The amounts of calcium (230.39 to 330.44 mg for the complete menus), magnesium (254.44 to 369.28 mg for the complete menu), potassium (326.58 to 464.58 mg for the complete menu), zinc (9.29 to 10.89 mg for the complete menu) and sodium (593.61 to 808.12 mg for the complete menu), were below the recommended values.

Energy value of individual nutrients

Table 3 shows the energy value of carbohydrates, fat, and proteins for the FFR1 and FFR2 menus. The energy value of carbohydrates for all menus (42.06-47.67 %), are below the recommended intake (50-55 %). The energy content of fat (39.32-48.57 %) was higher than the maximum recommended intake of 35 %. All menus had a protein intake between 10 and 15 %, except for the DW of FFR1 (9.35 %) which is below 10 % and the CLB of FFR2 (15.72 %) which exceeds 15 %.

Figure 1: Commune of Cocody.

Figure 2: Commune of Adjamé.

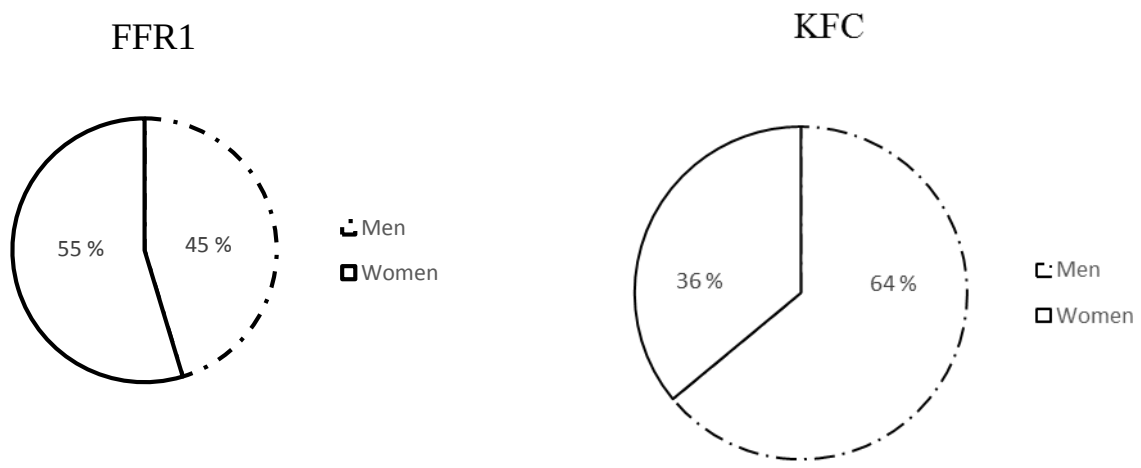

Figure 3: Gender distribution at FFR1 and FFR2.

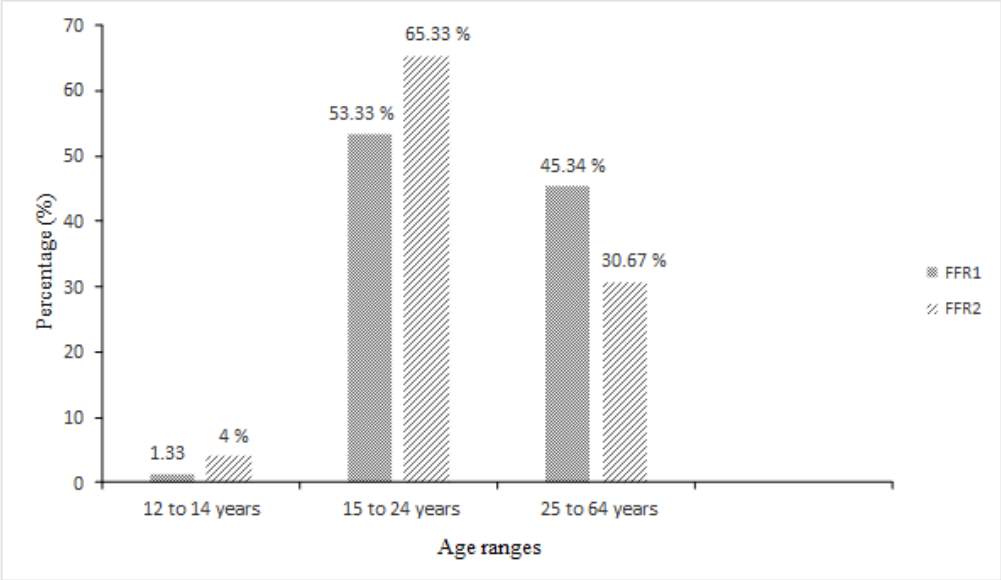

Figure 4: Age distribution of the study population.

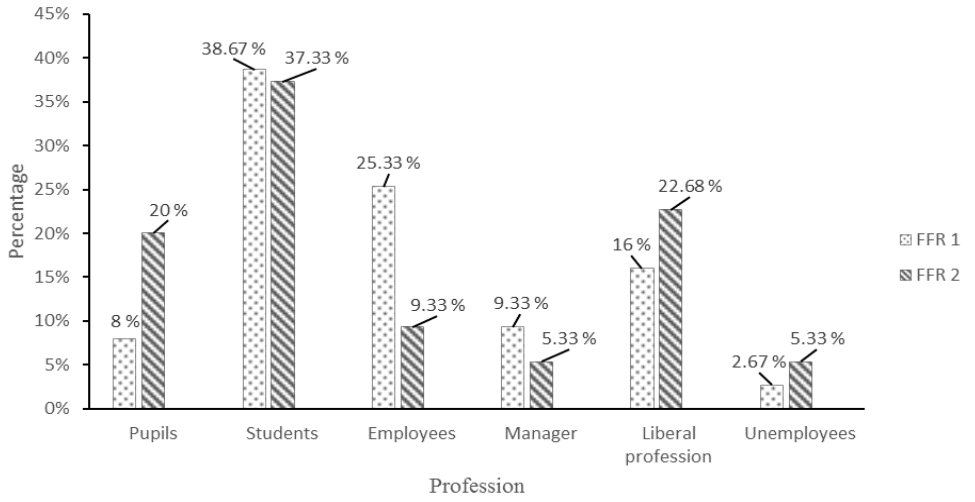

Figure 5: Profession distribution of the study population.

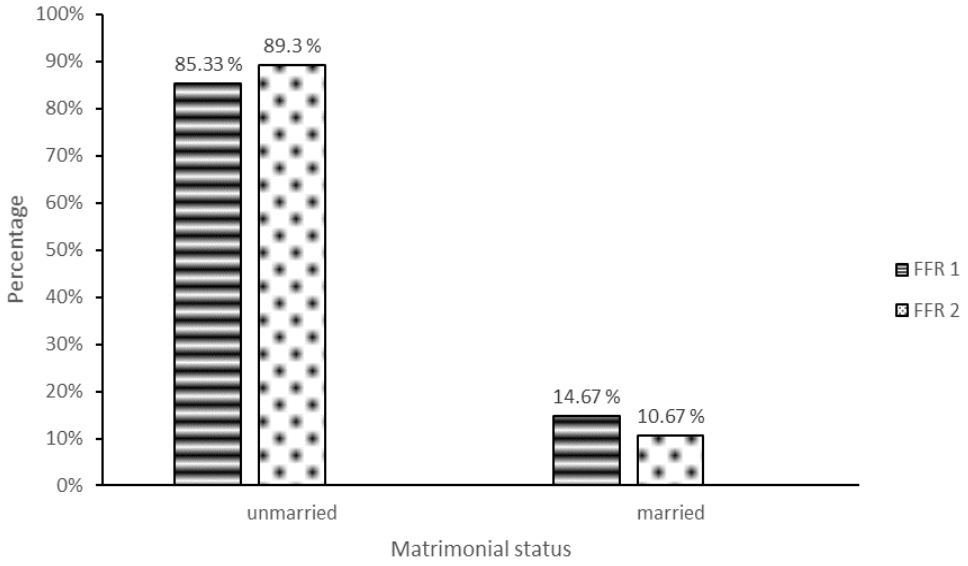

Figure 6: Matrimonial status.

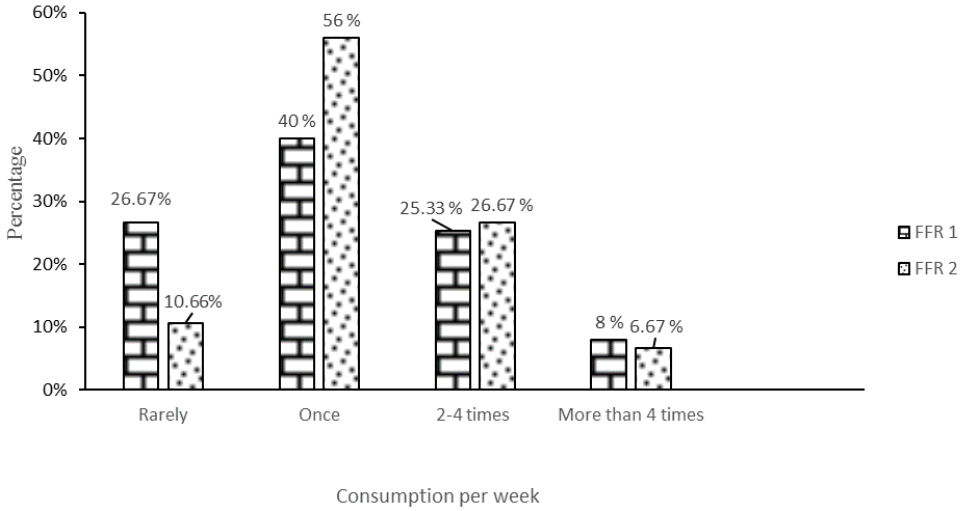

Figure 7: Meal frequency per week.

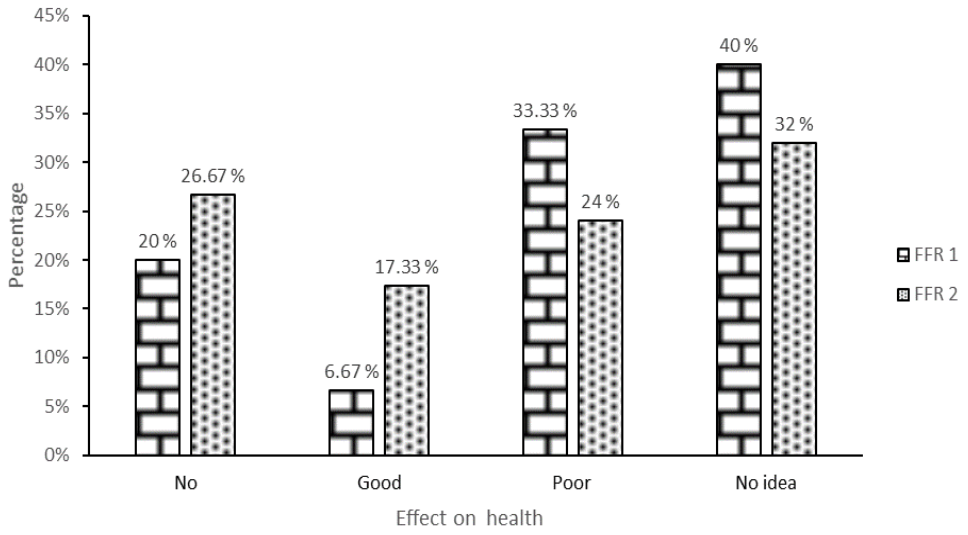

Figure 8: Effect of fast-food consumption on health.

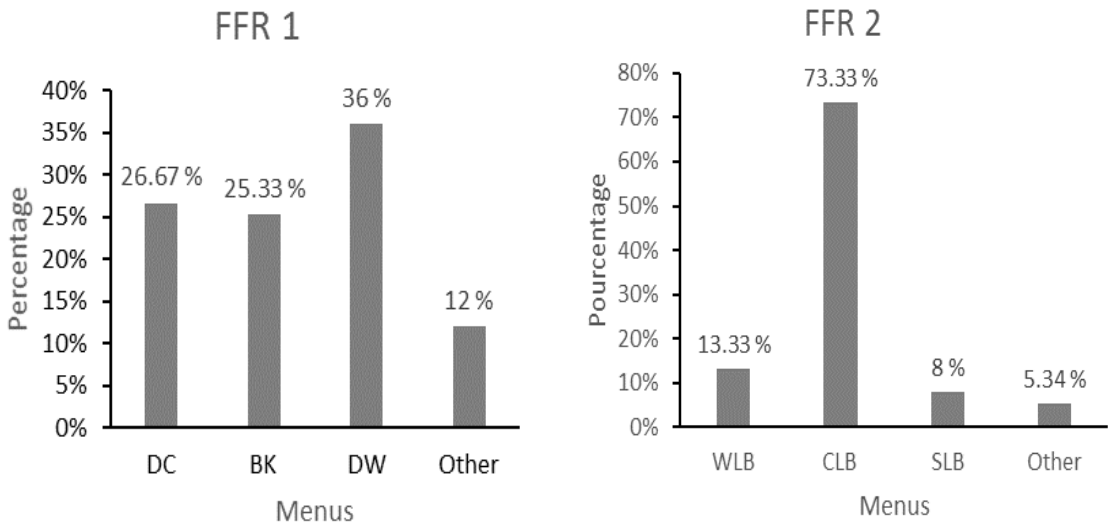

Figure 9: Consumer Choice at FFR1 and FFR2.

Table I: Main components and energy of FFR1 and FFR2 menus.

	Menus of FFR1			Menus of FFR2		
	DW	**DC**	**BK**	**SLB**	**WLB**	**CLB**
Parameters						
Dry matter (%)	91,43 ± 0,43^{a}	92,21 ± 0,30^{c}	92,19 ± 0,05^{c}	91,15 ± 0,55^{a}	91,19 ± 0,26^{a}	91,94 ± 0,55^{b}
Water content (%)	8,56 ± 0,43^{b}	7,78 ± 0,30^{a}	7,80 ± 0,07^{a}	8,84 ± 0,55^{c}	8,81 ± 0,26^{b}	8,06 ± 0,55^{a}
Ash (%)	3,09 ± 0,07^{a}	3,27 ± 0,23^{a}	3,32 ± 0,24^{a}	4,35 ± 0,26^{c}	4,14 ± 0,07^{c}	3,61 ± 0,27^{b}
Protéin (%)	15,33 ± 0,69^{a}	22,53 ± 0,50^{d}	17,34 ± 0,23^{b}	18,63 ± 0,54^{c}	17,30 ± 0,25^{b}	24,75 ± 0,52^{e}
Fat (%)	36,21 ± 0,39^{c}	30,33 ± 0,57^{b}	29,66 ± 0,57^{b}	30,0 ± 0,06^{b}	29,29 ± 0,53^{b}	27,53 ± 1,28^{a}
Fiber (%)	1,83 ± 0,01^{d}	3,48 ± 0,15^{e}	5,17 ± 0,15^{f}	0,26 ± 0,10^{a}	0,78 ± 0,02^{c}	0,44 ± 0,04^{b}
Carbohydrates (%)	36,43 ± 0,58^{a}	36,05 ± 0,11^{a}	41,85 ± 0,68^{d}	38,17 ± 1,03^{b}	40,34 ± 0,56^{c}	36,03 ± 1,13^{a}
Energy value of the complete meal (food and drink) (kcal/100 g)	672,54 ± 1,59^{e}	646,95 ± 2,98^{d}	642,82 ± 1,62^{c}	637,25 ± 1,62^{b}	634,12 ± 1,92^{b}	626,59 ± 2,60^{a}

alues with the same letters on the same line are not significantly different at the 5% level and values with different letters on the same line are significantly different at the 5% level.

Table II: Mineral content of FFR1 and FFR2 menus.

	Menus of FFR1			Menus of FFR2			ANC (mg) (ANSES,2016)
	DW	**DC**	**BK**	**SLB**	**WLB**	**CLB**	
Minerals (mg/100g)							
Phosphorus	416,03 ± 1,00^{b}	463,0 ± 2,00^{d}	446,93 ± 6,89^{c}	357,95 ± 1,00^{a}	356,00 ± 1,00^{a}	352,33 ± 1,52^{a}	-
Magnesium	105,70 ± 0,62^{c}	118,86 ± 2,15^{d}	119,03 ± 1,55^{d}	101,37 ± 0,81^{a}	103,73 ± 0,50^{b}	101,96 ± 0,50^{a}	-
Potassium	164,20 ± 2,64^{e}	156,16 ± 20,74^{c}	160,80 ± 11,78^{d}	130,11 ± 2,84^{a}	128,36 ± 33,85^{a}	131,86 ± 17,92^{b}	-
Sodium	281,60 ± 0,72^{d}	296,00 ± 0,52^{d}	249,60 ± 1,02^{c}	236,50 ± 0,66^{b}	227,00 ± 0,78^{b}	207,60 ± 1,14^{a}	-
Calcium	68,73 ± 0,56^{b}	69,23 ± 0,87^{b}	64,16 ± 1,02^{a}	91,79 ± 0,35^{c}	92,82 ± 0,23^{c}	93,7 ± 0,36^{d}	-
Iron	5,07 ± 0,96^{a}	7,40 ± 0,55^{b}	8,16 ± 0,85^{b}	7,58 ± 0,42^{b}	9,39 ± 0,46^{c}	9,96 ± 0,40^{c}	-
Zinc	4,33 ± 0,50^{c}	4,76 ± 0,23^{d}	3,93 ± 0,15^{b}	3,70 ± 0,05^{b}	2,79 ± 0,30^{a}	3,09 ± 0,08^{a}	-
Menus mass	618	450	566	251	227	357	**ANC (mg) (ANSES,2016)**
Minerals of complete menu (mg)							
Phosphorus	2 571.07	2 083.50	2 529.62	898.45	1 267.36	1 241.36	700
Magnesium	653.23	534.87	673.71	254.44	369.28	359.24	375
Potassium	1 014.76	702.72	910.13	326.58	456.96	464.58	3500
Sodium	1 740.29	1 332.00	1 412.74	593.62	808.12	731.44	2000
Calcium	424.75	311.54	363.15	230.39	330.44	330.13	800
Iron	31.33	33.30	46.19	19.03	33.43	35.09	14
Zinc	26.76	21.42	22.24	9.29	9.93	10.89	10

Values with the same letters on the same line are not significantly different at the 5% level and values with different letters on the same line are significantly different at the 5% level.

Table III: Energy shares of nutrients in the different FFR1 and FFR2 menus.

Menus of FFR1					Menus of FFR2			ANC (%) (ANSES,2016)
Nutriments		**DW**	**DC**	**BK**	**SLB**	**WLB**	**CLB**	
Carbohydrate	**Energy (kcal)**	282,20 ± 7,11	283,73 ±0,77	306,43 ± 2,79	292,37 ± 3,49	300,39 ± 2,26	283,11 ±4,56	50 - 55
	Share (%)	42,06 ± 0,78^{a}	43,87± 0,28^{b}	47,67 ± 0,55^{d}	45,90 ± 0,43^{c}	47,37 ± 0,47^{d}	44,95± 0,99^{b}	
Fat	**Energy (kcal)**	325,89 ± 3,51	273 ±5,20	267 ± 5,19	270± 0,00	264,51 ± 4,81	247,8 ± 11,57	30 - 35
	Share (%)	48,57 ± 0,82^{c}	42,19 ± 0,62^{b}	41,53 ± 0,70^{b}	42,39 ± 0,14^{b}	41,71 ± 0,65^{b}	39,32 ± 1,37^{a}	
Protein	**Energy (kcal)**	62,79 ± 0,86	90,13 ±2,01	69,39 ± 0,92	74,55 ± 2,18	69,23 ± 1,02	99,01 ± 2,08	10 - 15
	Share (%)	9,35 ± 0,16^{a}	13,93 ± 0,35^{d}	10,79 ± 0,16^{b}	11,70 ± 0,35^{c}	10,91 ±0,18^{b}	15,72 ± 0,52^{e}	

Values with the same letters on the same line are not significantly different at the 5% level and values with different letters on the same line are significantly different at the 5% level.

DISCUSSION

The results on the characteristics of FFR1 and FFR2 consumers had showed that both women (55 % at FFR1 and 36 % at FFR2) as well as men (45 % at FFR1 and 64 % at FFR2) are consumers of fast-food meals. These results are confirmed by Brunet et al. (2017), who revealed that the tendency to consume fast-food meals, is not related to gender. In today's modern society, both women and men are increasingly engaged in professional activities that take them away from home (97.3 % of FFR1 respondents and 94.7 % of FFR2 respondents). Therefore, they are looking for alternative ways to eat outside the home. So, their preferred choice is the fast-food which would save them time (SNARR, 2015). Consumers were mostly teenagers (53.33 % at FFR1 and 65.33 % at FFR2), mostly students (38.67 % at FFR1 37.33 % at FFR2). These results suggest that this part of the population adopts, much more easily, the Western way of eating contrary to the adults, especially those of 35 years and more, who remain attached to the traditional cooking. This trend is the same as that shown by the survey of the German statistical office (Statista, 2018). According to this study, the reasons that explain the attachment of young people to fast-food restaurants are, in addition to the taste of the dishes that they enjoy, the conviviality and the modernity of these places. These fast-food restaurants were mostly frequented by unmarried (85.33 % at FFR1 and 89.33 % at FFR2) and less by married people. These results are consistent with those of the studies by Peirera et al. (2005). According to these authors, this can be explained by the fact that single people are generally forced to eat outside their homes.

The largest proportion of respondents consumed a fast-food meal, at most, once a week (40 % of FFR1 respondents and 56 % of FFR2 respondents). This is due to the fact that respondents find menu prices high. Despite this low frequency of consumption, these consumers may be prone to obesity. Indeed, the studies of Duffey et al. (2009) showed that regular consumption of fast-food (≥ one to three times per week), would be associated with a high risk of obesity, increased risk of type 2 diabetes and metabolic disorders.

The results on the biochemical composition of the menus made it possible to determine the contents of the main constituents, minerals and the quantities of energy in the DW, DC, BK from FFR1 restaurant and SLB, CLB and WLB from FFR2 restaurant.

The water contents of the six menus ranged from 7.78 to 8.84 %. These varying water contents, could be explained by the methods used for the preparation of these dishes and by the elements which compose them. Indeed, some of these meals, such as the DW (8.56 %) and the SLB (8.84%), contained significantly more fresh vegetables than others.

The results also showed that these menus contain a lot of carbohydrates (36.03 to 41.85 %), fat (27.53 to 36.21%) and protein (15.33 to 24.75 %). This content of carbohydrates, lipids and proteins, could be explained by the composition of these meals, essentially made with meat, mayonnaise, ketchup, bread, and by their cooking method (generally frying). These results are consistent with those of Kaushik et al. (2011), who showed that fast-food dishes have high levels of fat; this fat is mainly composed of trans fatty acids. According to Asgary et al. (2009), this high amount of trans fatty acids predisposes consumers to the risk of chronic diseases such as cardiovascular disease, obesity, metabolic disorders and a high accumulation of abdominal fat.

The study revealed that the studied dishes contained little fiber (0.26 to 5.17 %). These fiber contents are well below the recommended intake of 25 to 30 g of fiber per day. These results are in agreement with those of Peirera et al. (2005). According to their study, fast-food restaurants offer meals that are low in fiber. According to the same study, there is a strong correlation between a low-fiber diet and the development of chronic disease. Indeed, for an increase of 8 g per day of fiber consumption, the total number of deaths, the incidence of coronary heart disease, type 2 diabetes and colorectal cancer, would decrease by 5 to 27 %. Protection against stroke and breast cancer would also be increased. According to Schelinguer et al (2014), fiber consumption would also promote better weight control.

In term of energy, the two fast-food menus provided amounts ranging from 626.59 to 672.54 Kcal per 100 g of food, with FFR1's dishes being the most energetic (the DW alone produces 672.54 Kcal). All these dishes have very high energy densities for a single meal, especially if they are eaten as snacks. The WHO recommends an energy intake of 10 % for the total of the snacks of the day of the teenagers, i.e. an average of 200 kcal. The menus offered by FFR1 and FFR2 therefore have energy intakes far above this value (200 kcal). A regular consumption of these "hyperenergetic" meals, could therefore, be dangerous, as they could promote the accumulation of fat and consequently, predispose to overweight, obesity, as well as to all the chronic diseases induced by y them. These results are in agreement with those of Vanzyl and al. (2010) and Prentrice and jebb (2003), who have showed that meals purchased in fast-food restaurants, tend to be dense in energy.

The phosphorus and iron contents of FFR1 and FFR2 menus are higher than the recommended nutritional intake. It’s also valuable for magnesium and zinc in FFR1 menus. The consumption of these menus could cover the needs for these minerals. However, the calcium and potassium content of these menus is below the recommended values. Their consumption as a snack or even as a main meal, would not cover the needs in these minerals. Indeed, their intake is insufficient, unless the other meals contain enough. These results are in agreement with those of Isganaitis et Lustig (2005) and Pereira et al. (2005), who have showed that fast-food tends to contain

more fat and fewer micronutrients. However, the sodium levels for full menus are very high. They range from 469.8 mg for the least sodium-rich menu (WLB) to 1591.10 mg for the most sodium-rich dish (DW). These amounts could be considered significant, because the WHO recommends a daily consumption of no more than 2000 mg (OMS, 2017), in order to prevent high blood pressure. FFR1 and FFR2 menus, alone, provide 23.49 to 79.55 % of this intake. If these meals are consumed regularly, they could promote an excess of sodium in the blood, insofar as they represent only one of the meals taken during the day by the respondents (snack); sodium is present in other foods and in almost all beverages consumed daily. In addition, in all menus, the amounts of sodium are higher than those of potassium, while the WHO recommends 3 times more potassium than sodium (OMS, 2013). According to the WHO (OMS, 2013), low potassium intake is associated with several non-communicable diseases, including high blood pressure, cardiovascular disease, renal lithiasis, and low bone mineral density. Thus, the consumption of the studied menus could therefore increase the risk of developing hypertension and associated diseases.

In all menus, the energy share of carbohydrates (42.06-47.67 %) is in line with the recommended (40-55 % for carbohydrates). Energy from fat (39.32-48.57 %) was generally higher than the recommended 35-40 %. These results suggest that, for all the menus, the amounts of energy that should be provided by lipids are not respected. With the exception of the DW from FFR1, all meals have energy shares of protein (10.79-15.72 %) that meet the recommendation of 10-20 %. In general, the energy content of the nutrients on the various menus does not comply with the regulations. These menus are therefore not balanced. They provide more fat than necessary. These fats will therefore accumulate in the tissues and cause overweight, which could promote other diseases related to overweight.

CONCLUSION

This study was conducted to determine the socio-demographic profile of the customers of two fast-food restaurants in the communes of Cocody and Adjamé (FFR1 and FFR2) and the nutritional quality of the main menus consumed of these restaurants. The consumption survey conducted in these stores have revealed that the main consumers are students and unmarried people. It also showed that the menus most requested by these restaurants were the DW, DC, BK at FFR1 and CLB, SLB and WLB at FFR2. Biochemical analysis of these dishes had showed that they were very energetic with high amounts of fat, sodium but low fiber and most of the main minerals needed by humans. Therefore, it appears that, due to their excessive content of excessive lipid and sodium content and their high energy intake, with respect to the recommended nutritional, the menus analyzed had not good nutritional quality and are not balanced. Their regular consumption as the main meal of the day could be the origin of very serious chronic of very serious chronic diseases.

ACKNOWLEDGEMENT

We would like to thank the persons in charge of both fast-food restaurants for their support in carrying out this study. We also remain grateful to the director of the food biotechnology laboratory.

CONFLICT OF INTEREST: We have no conflict of interest to declare

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